

We claim:

1. A method for delivering an active agent to the lungs of a human patient, said
5 method comprising delivering an aerosolized active agent formulation at an inspiratory
flow rate of less than 17 liters per minute.
2. The method of claim 1 wherein the inspiratory flow rate is less than or equal to
10 liters per minute.
3. The method of claim 1 wherein the aerosolized active agent formulation
10 comprises an active agent in dry powder form.
4. The method of claim 1 wherein the aerosolized active agent formulation
comprises an active agent in nebulized form.
5. The method of claim 1 wherein the aerosolized active agent formulation
comprises an active agent in admixture with a propellant.
- 15 6. The method of claim 1 wherein the aerosolized active agent formulation
comprises an active agent solution.
7. The method of claim 1 wherein the aerosolized active agent formulation
comprises an active agent suspension.
8. The method of claim 1 wherein the aerosolized active agent formulation
20 comprises an active agent slurry.
9. The method of claim 1 wherein the active agent is selected from the group
consisting of cyclosporin, parathyroid hormone, follicle stimulating hormone, alpha-1-
antitrypsin, budesonide, human growth hormone, growth hormone releasing hormone,
interferon alpha, interferon beta, growth colony stimulating factor, leutinizing hormone
25 releasing hormone, calcitonin, low molecular weight heparin, somatostatin, respiratory
syncytial virus antibody, erythropoietin, Factor VIII, Factor IX, ceredase, cerezyme and
analogues, agonists and antagonists thereof.

10. A method for delivering insulin to the lungs of a human patient, said method comprising delivering an aerosolized insulin formulation at an inspiratory flow rate less than 17 liters per minute.
11. A device for increasing the bioavailability of an active agent, said device
5 comprising a flow restricter for limiting the flow of an aerosolized active agent formulation to less than 17 liters per minute.
12. The device of claim 11 wherein the flow restricter is a simple orifice.
13. The device of claim 12 wherein the flow restricter comprises apertures of 0.5 to 0.9 mm in diameter.
- 10 14. The device of claim 11 wherein the flow restricter is a valve that provides for increasing resistance with increasing flow rate.
15. The device of claim 11 wherein the flow restricter is a valve that provides for decreasing resistance with increasing flow rate.
16. The device of claim 11 wherein the flow restricter is a valve that provides for
15 high resistance at all flow rates except the desired flow rate.
17. The device of claim 11 wherein the active agent is selected from the group consisting of insulin, cyclosporin, parathyroid hormone, follicle stimulating hormone, alpha-1-antitrypsin, budesonide, human growth hormone, growth hormone releasing hormone, interferon alpha, interferon beta, growth colony stimulating factor, leutinizing
20 hormone releasing hormone, calcitonin, low molecular weight heparin, somatostatin, respiratory syncytial virus antibody, erythropoietin, Factor VIII, Factor IX, ceredase, cerezyme and analogues, agonists and antagonists thereof.
18. A device for delivering an active agent to the lungs of a human patient, wherein said device delivers an aerosolized active agent formulation at an inspiratory flow rate
25 of less than 17 liters per minute.
19. The device of claim 18 wherein the aerosolized active agent formulation is in dry powder form.

20. The device of claim 18 wherein the inspiratory flow rate is 10 liters per minute or less.

21. A device for delivering insulin to the lungs of a human patient, wherein said device delivers an aerosolized insulin formulation at an inspiratory flow rate of less
5 than 17 liters per minute.

22. The device of claim 21 wherein the inspiratory flow rate is 10 liters per minute or less.